

REMARKS

Claims 1-6 and 8 are pending.

Claims 1-6 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over US Pub. No. 2005/0072192 to Arimondi et al. (“Arimondi”) in view of US Pub. No. 2002/0059816 and U.S. Patent No. 6,400,878 to Nagayama et al. (“Nagayama”) and US Pub. No. 2003/0126891 to Suzuki et al. (“Suzuki”).

Applicants traverse.

The Examiner contends that Arimondi describes a method for preparing an optical fiber preform having through holes to be formed into air holes and drawing the optical fiber preform into a fiber with the air holes. The Office Action acknowledges that Arimondi does not disclose the presence of oxygen gas in the through holes. The Office Action relies on Suzuki to cure the admitted deficiencies of Arimondi. The Examiner opines that Suzuki teaches SiO gas is produced when a silica preform is heated to a “high enough” temperature, such as, a drawing temperature. In the Response to Arguments section, the Examiner concludes that one of ordinary skill in the art would expect that the production of SiO gas is not limited to just an outside surface of the preform, but would occur on any surface of the preform that is heated.

Further, the Office Action admits that Arimondi does not disclose a third step of heating the optical fiber in an additional furnace. The Office Action also relies on Suzuki to cure the admitted deficiencies of Arimondi. The Examiner opines that Suzuki teaches an additional heating step after drawing for stabilizing the SiO present.

The Examiner further concedes that Arimondi does not disclose the third step of the claimed process, *i.e.*, “heating the optical fiber in an additional furnace,” as recited in claim 1. The Examiner relies on Nagayama to cure the admitted deficiencies of Arimondi and Suzuki. In

the Response to Arguments section, the Examiner contends that Nagayama teaches achieving the heating with a heating furnace.

Turning to the prior art, Arimondi describes a process for manufacturing a micro-structured optical fiber. Arimondi is *silent* on *transmission loss* of the fiber and preventing the transmission loss.

An aspect of claim 1 includes a third step of heating the optical fiber to a temperature in the range of 900°C to 1300°C in an additional heating furnace provided downstream of the drawing furnace, such that the SiO is stabilized to decrease Rayleigh scattering at the interfaces and to decrease a transmission loss. However, Arimondi does not disclose or suggest this step, and apparently is unaware that an unstable SiO bond causes transmission loss. Further, as admitted by the Examiner, Arimondi does not disclose a third step of heating the optical fiber in an additional furnace. Thus, Arimondi apparently is unaware of the unexpected improvement in suppressing formation of SiO provided by the claimed method of producing an optical fiber having air holes.

It is the Applicants' understanding of the Examiner's position that Suzuki discloses a method for fusing an optical fiber preforms. The process of Arimondi is replaced with the method of fusing an optical preform of Suzuki (first modification) to suppress the formation of the SiO gas by using oxygen gas while drawing, and further replaced with Nagayama's heating process using an additional heating furnace (second modification) to provide the claimed subject matter, even though Suzuki *teaches away* from using an oxidative atmosphere during sublimation because the oxygen gas produces a silica cloud that causes flaws, great strain, and cracking in the fiber surface during fiber drawing. Further, Suzuki is *silent* regarding a method of decreasing a transmission loss, as required in claim 1.

Further, Nagayama does **not** disclose or suggest forming an optical fiber preform having through holes that are drawn into an optical fiber having air holes. The second modification of the first modification based on Suzuki is required to arrive at the claimed subject matter. This results in a strong indication of a hindsight reconstruction of the claimed subject matter based on the use of the Applicants' disclosure as a template. The Examiner's retrospective assessment of the claimed subject matter and use of unsupported conclusory statements are not legally sufficient to generate a case of *prima facie* obviousness. None of the references disclose or suggest that SiO is produced in the through holes and that SiO unstably adheres to the interfaces of the air holes, as required by claim 1.

Therefore, a person skilled in the art would not be motivated to modify Arimondi's process based on the teachings of Suzuki, **and then**, modify Arimondi's modified process based on the teachings of Nagayama.

As Arimondi, Suzuki, and Nagayama do not disclose the same method of producing an optical fiber as disclosed by the present inventors, and even if combined still fail to disclose or suggest the elements recited by claim 1, the combination of Arimondi, Suzuki, and Nagayama do not render the method as recited by claim 1 obvious.

Claim 8 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Arimondi in view of Nagayama and Suzuki, as applied to claim 1 above, and further in view of US Pub. No. 2002/0174692 to Kuwahara et al. ("Kuwahara").

The Office Action acknowledges that Arimondi, Suzuki, and Nagayama do not disclose a drawing temperature. The Office Action relies on Kuwahara in attempt to cure the admitted deficiencies of Arimondi, Suzuki, and Nagayama. The Examiner opines that Kuwahara teaches a drawing step at 1950°C.

Although not relied upon to do so, Kuwahara does not disclose forming an optical fiber preform having through holes and drawing the preform into an optical fiber having through holes in the drawn fiber. Kuwahara is *silent* regarding producing SiO in the through holes and that SiO unstably adheres to the interfaces of the through holes, as required by claim 1.

In addition to the above, none of the references, individually or combined, are directed to the problem solved by Applicant, namely, reducing transmission loss by reducing the amount of SiO in the through holes of the optical fiber. Accordingly, the rejection does not set forth a *prima facie* case of obviousness of claim 8 over the prior art relied upon by the Examiner. Dependent claim 8 is allowable for at least for the same reasons as independent claim 1, and further distinguishes the claimed method.

For all of the foregoing reasons, it is requested that the rejection of claims 1-6 and 8 under 35 U.S.C. § 103(a) be reconsidered and withdrawn.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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